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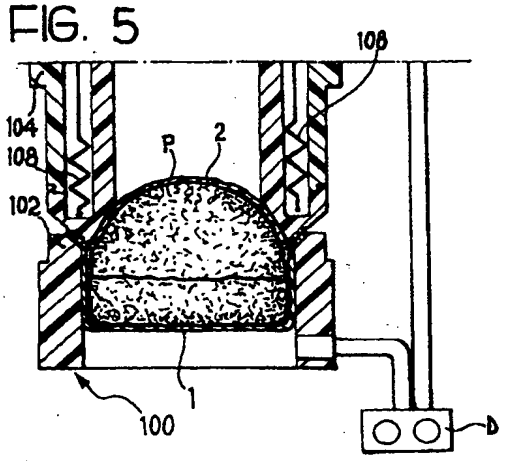
## (54) Method and a device for packaging a product between two wrappers

(57) A close-fitting wrapper for a product (P) is obtained from two sheets (1, 2), the first of which is formed into a hollow shape so as to wrap around part of the product (P). The other sheet (2) is applied over the remaining part of the product (P) so as to take on a shape complementary to that of the product itself. In order to seal the wrapper, the two sheets (1,2) are joined peripherally over a frusto-conical surface so as to facilitate a subsequent forming operation in which the collar part, at which the two sheets have been sealed, is deformed against the product (P).

FIG. 5

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## Description

The present invention relates to a method according to the preamble of Claim 1, which is known, for example, from EP-A-0 591 742. This document illustrates a solution in which a product such as, far example, a praline or like food article, is wrapped in a close-fitting wrapper made from two sheets, usually of aluminium foil. The first sheet is formed into a bowl shape so as to surround the major part of the product. The other sheet is laid over the remaining part of the product so as to take on a form complementary to that of the product itself. After the two sheets have been joined around their peripheries to give the desired degree of sealing, the wrapper thus formed is shaped so as to cause the first sheet to cover practically the entire product, concealing the second sheet from view.

During the practical application of this method, the Applicant has been able to note the particular importance assumed by factors such as:

- the fact that, as a result of the shaping of the two sheets closely against the product, their peripheral regions which are joined become wrinkled which makes the sealing conditions generally more critical;
- the fact that applications exist which differ from that illustrated specifically in EP-A-0 591 742 in which one of the two sheets is not wrapped completely around the product, covering the other sheet: this is true, particularly, in those applications in which sheets with substantially identical dimensions are used instead of one sheet being substantially larger than the other;
- the tendency, found to an ever increasing extent in the packaging industry, to reduce the thicknesses of the sheets constituting the wrapper without thereby reducing the mechanical strength of the wrapper as a whole, particularly with regard to risk of tearing, and
- the ever more stringent requirement to ensure the hermetic sealing of the wrapper against external agents such as moisture and other factors.

The object of the present invention is, therefore, to provide an improved method, particularly with regard to satisfying the requirements set out above.

According to the present invention, this object is achieved by a method having the further characteristics claimed in Claim 1. A further subject of the invention is the related equipment as called for in Claim 10.

In summary, the invention is based on the recognition of the fact that, in an unexpected manner, the requirements explained above are satisfied excellently if the two sheets which are connected together in order to close the wrapper are joined over a surface which is generally conical or, more correctly, frusto-conical in shape (the term "conic" and "frusto-conic" also includes substantially similar or equivalent geometries such as, for example, pyramidal or frusto-pyramidal) instead of in a plane which is generally perpendicular to the direction in which the sheets are brought together (or coupled).

The invention will now be described purely by way of non-limitative example, with reference to the appended drawings in which:

- Figures 1 to 6 illustrate successive steps in the method according to the invention, and
- Figure 7 illustrates the final result of the wrapping operation comprising the steps illustrated in Figures 1 to 6.

The product which it is intended to wrap is constituted, in the embodiment illustrated, by a praline P having a shape which can be likened approximately to a sphere. More specifically, in the embodiment illustrated here, (which is such), reference is made to a praline of a type known per se constituted by an upper hemispherical part which overlies a lower cylindrical or upwardly-diverging frusto-conical part. The praline P in question may be likened approximately to a spherical praline P having a sort of squashed lower part bounded by a flat base.

More particularly, as will be better explained below, and as will best be appreciated from a comparison with the drawings of EP-A-0 591 742, the praline P illustrated in the appended drawings lends itself to packaging in a closely fitting wrapper of sheet material without requiring insertion in a paper cup in order to isolate and stabilise it.

With regard to the nature of the product P, one may, for example, be dealing with a praline constituted by a wafer shell with a paste or cream filling and an outer coating of chocolate, for example with nuts, or like coatings with the possible addition of shredded coconut, hazelnut chips, etc such as to give the outer surface of the praline P a generally irregular appearance.

This factor may make the wrinkling of the sheets constituting the wrapper around the zone of sealing more evident during the formation of the wrapper: it is this latter appearance which has already been indicated in the introduction to the present specification.

It should, however, be stressed that the invention can be applied to products of an entirely different nature and shape. While remaining within the field of the confectionary industry, reference may be made to hollow or filled chocolate eggs, various chocolates, pralines of generally spherical shape with a flat base, small meringues, etc.

In order to form a closely fitting wrapper around the product P, two sheets of aluminium foil or other sheet material indicated 1 and 2 are used.

The choice of a sheet of aluminium is considered preferable because of its ready adaptability to the shape of the product even if this has surface irregularities. In particular, it is preferred for the two sheets 1 and 2 to be of the type generally defined as "coupled", i.e. coated on their inner faces intended to face the product P with a

layer of hot-melt material and/or resin which can enable them to be joined together by a sealing process (typically heat-sealing or ultrasonic welding). Depending on the applicational requirements, however, alternative solutions are possible, varying from simple connection by mechanical shaping to welding (glueing) with the supply of additional material which may make the use of a "coupled" material superfluous.

The best results have been obtained up till now by the Applicant with the use of aluminium foils, possibly embossed, and having thicknesses of between 7 and 12 microns, coated on their inner faces with a coupling film of a material such as polythene, polypropylene, polyester and the coupling film known commercially as SURLYN. The thicknesses of the films used were in the range 3/4 microns for the SURLYN (equivalent to a weight of the order of 9-10g/m$^2$) to 5-12 microns for the polyolefin films mentioned above.

Experiments carried out by the Applicant have given excellent results even for the thinnest films (aluminium plus coating). This is in terms of tearing risk and with regard to sealing and resistance to penetration by external agents.

In the embodiment of the invention illustrated here, the two wrapper sheets 1 and 2 have substantially the same dimensions. Naturally, it would be possible to make different choices, such as that described, for example, in EP-A-0 591 742 in which one of the sheets has much greater dimensions than the development in plan of that part of the product which it faces and than the other sheet.

In order to clarify this, in the embodiment illustrated here, one may consider the sheets 1 and 2, which are usually square or rectangular, to have such dimensions that each can cover slightly more than half the product P, thus leaving the opposite part of the product uncovered.

The two halves of the product indicated above (upper hemispherical cap and cylindrical or frusto-conical base) may be seen as separated by an imaginary equatorial plane E which identifies the maximum section of the product: it will, however, be appreciated that this is true even if the product P has a different shape, such as, for example a spherical or ovoid shape, or a shape which reproduces the features of a person in miniature. Whatever the shape of the product P, it will, in general, always have an identifiable equatorial plane which defines its zone of maximum section: in this respect, one may again note that sweet products, whatever their nature, are very often constituted by two complementary parts (hollow or filled) joined together at such an equatorial plane.

This equatorial plane is, in turn, perpendicular to the general direction (indicated D in Figure 3 of the appended drawings) in which the two halves of the product P are brought together. As will be better understood from the following, this is the same direction as that in which, the two sheets 1 and 2 are brought together.

The first step in the operation of wrapping the product P consists of forming the sheet 1 into a generally cup or bowl shape.

This operation may be carried out, for example, by means of a tool comprising a die having a cavity which can be entered by a punch: for a schematic representation of this solution, reference may be made to the document EP-A-0 591 742, already mentioned several times in the presentation description.

In a particularly preferred embodiment of the invention, however, the shaping of the sheet 1 is achieved by means of a generally tubular forming tool 100 in which a vacuum (subatmospheric pressure) source, schematically indicated D, acts. The source D acts, in known manner, to draw the sheet 1 into the tubular cavity of the tool 100, forming the latter into a corresponding cup-shape. The suction causes the evacuation of any air bubbles which might form during both the shaping and the subsequent steps of forming the wrapper from the sheets 1 and 2 and, in particular, in the cavity jointly formed thereby. Shaping under these low-pressure or vacuum conditions (or, in general, by evacuation of air) has been found to be particularly advantageous for achieving very close fitting of the wrapper formed by the sheets 1 and 2 around the product P.

It will also be appreciated that the mouth portion of the tool 100 in correspondence with which a corresponding mouth part of the cup-shaped sheet 1 is formed, is generally frusto-conical in shape, following a theoretical conical surface, the axis of which coincides with the central axis of the tool 100. This axis is in turn oriented in the general direction of coupling of the sheets 1 and 2 (direction D in the drawings).

As has already been stated in the introduction, the use of a frusto-pyramidal surface with a sufficiently large number of sides would be equivalent.

The conic angle is preferably of the order of 45°, with the option that this could be increased or reduced to accord with specific applicational requirements, particularly with regard to the material constituting the sheets 1 and 2.

Again, in the embodiment illustrated in the drawings, the conicity is oriented with an upward divergence whereby the sheet 1 has an upwardly flared open mouth when the shaping is completed.

This choice is made for reasons which will become clearer below and, in particular, in the embodiment illustrated, because the edge of the sheet 1 is intended to be folded upwardly so as to cover at least part of the sheet 2 in the finished wrapper.

The use of a complementary solution could however be considered (as confirmed by specific experiments made by the Applicant), the sheet 2 being folded downwardly over the sheet 1 covering the product P. In this case, the complementary shaping required for the mouth portion of the sheet 1 could be achieved by forming the edge portion 102 with an upwardly converging conic shape, that is diverging downwardly, or - as will be understood - by adopting, for the tool 100, a configura-

tion similar to that adopted for the tool 104 which will be described below.

While the body of the tool 100 is made from a generally rigid material, typically metal, the mouth portion 102 is preferably made from a generally softer material (typically an insert), for example TEFLON.

The generally concave, or cup-shape, given to the sheet 1 is intended to render this able to receive the product P (in the example illustrated, the lower part) within it as shown schematically in Figure 3. This drawing presupposes that the product P is introduced (by known means, not illustrated) into the sheet 1, shaped into a cup-shape, while the latter is still within the die 100. This choice, although preferred (particularly with regard to the choice of the vacuum source D), should not be considered essential. After the sheet 1 has formed shaped into the cup-shape, it may be removed from the tool and transferred to another cavity arranged to support the sheet 1 for the insertion of the product P. This is preceded or followed by insertion in a shaping tool having a mouth portion similar to the mouth portion 102 so as to give the mouth portion of the sheet 1 the desired conical shape.

It goes without saying that the solution described herein with reference to the drawings has been found to be preferable in terms of optimising the procedure.

In these conditions (that is, in the position illustrated in Figure 3) the other sheet 2 is now applied over the product P.

This result may be achieved by the supply (by known means not illustrated here) of the sheet 2 so as to adapt it to the upper part of the product P which projects above and out of the mouth portion of the cup-shaped sheet 1. Preferably the sheet 2 is applied by means of a suction tool 104 which ensures that the sheet 2 remains in the desired position for the forming of the sheet 2 itself by means of a tool 106 which may be constituted by the same tool 104 as that which positions the sheet 2 over the product P.

In the embodiment illustrated here, and with particular reference to Figure 4, it is assumed that the tool 104, which also has a generally tubular structure, is also connected to the vacuum source D which acts on the lower tool 100. It is thus presumed that the sheet 2 is held softly against the downwardly facing mouth portion, indicated 106, of the tool 104 as a result of the low pressure in the tool 104, the pressure in which is suitably reduced relative to that in the tool 100.

Naturally this is only one of the various solutions possible. For example, one may consider supplying the sheet 2 horizontally over the product P and retaining it in this position by means of a pusher element which fits on to the polar region of the product P from above so as to retain the sheet 2 when necessary.

Yet other solutions are possible: in each case, one is dealing with constructional details which do not in themselves have specific relevance for the purpose of carrying out the invention.

From an observation of Figures 4 and 5 it will be seen in particular, that the tool 104, usually of rigid material, such as metal, has a mouth portion 106 which is shaped externally with a frusto-conical surface (a reminder is again given that this term also includes frusto-pyramidal and like geometries) complementary to the frusto-conical internal shaping of the mouth portion 102 of the tool 100. In other words the mouth portion 106 of the tool 104 is made so that it can enter the mouth portion 102 of the tool 100 in such a manner that their respective frusto-conical surfaces are brought into frontal mating conditions.

As best seen in Figure 5, the equipment as a whole is such that it clamps together the peripheral portions of the sheets 1 and 2 which are brought together with their faces which may be coated with resin or lacquer, as mentioned previously, in contact. These peripheral portions of the sheets 1 and 2 are thus disposed on the frusto-conical surface defined jointly by the mouth portions 102 and 106 of the first tool 100 and the second tool 104 respectively.

As stated above, the mouth portion 102 of the tool 100 is preferably of a slightly deformable material (for example TEFLON). In a complementary manner, the mouth portion 106 of the tool 104 (made of a hard material such as metal) has sculpturing, for example annular grooves 107 (shown in Figure 4 even though they are not clearly visible for obvious reasons of scale). When the tools 100 and 104 are pressed axially against each other, the compressive force is such as to make the sculpturing 107 of the mouth portion 106 of the tool 104 deform the mouth portion 102 of the tool 100 into a complementary shape, for example with circular grooves. Naturally, the peripheral portions of the sheets 1 and 2 which are clamped between the mouth portions 102 and 106 of the tools 100 and 104 also take on corresponding profiles, that is a profile which, as seen in vertical section as in Figure 5, may be defined generally as corrugated.

This shaping of the peripheral portions of the sheets 1 and 2 which are joined together is intended to improve the seal between the two sheets, and hence the air-tightness of the wrapper formed, overcoming problems due to the fact that, as a result of their shaping around the product P, the portions of the sheets 1 and 2 intended to be joined together are themselves generally wrinkled.

As already stated, the facing marginal portions of the two sheets 1 and 2 may be sealed together in various ways to make the wrapper air-tight. It is possible to make use of purely mechanical coupling by making the local pleating resulting from the presence of the sculpturing 107 more firm, or to bond with additional material (glueing) or to make use, as is currently preferred, of heat-sealing, preferably by promoting the fusion (by the application of direct heat or ultrasonic vibrations) of a hot-melt coating provided on the inner faces of the sheets 1 and 2.

This latter may be achieved simply by forming the tool 104 as a heat-fusing tool of the type currently used,

for example, to apply sheets of aluminium foil coated with hot-melt material (so-called coupled aluminium) to the mouths of cup-shaped containers containing liquids or pastes, for example yoghurt and like products. For this purpose, the tool 104 has associated heating means shown schematically in Figures 4 and 5 in the form of resistors 108; obviously one is dealing with a schematic representation; the specific details are well known to experts in the art and do not require to be illustrated here, particularly since they are not relevant for the purposes of an understanding of the invention.

The presence within the tool 100 (and, as has been seen, in the tool 104 as well) of a subatmospheric pressure (vacuum) has been found to be excellent for the purposes of achieving a global action of evacuating the air from the zone in which the wrapper is applied and closed around the product P. This avoids the finished wrapper retaining air between the outer surface of the product P and the inner surfaces of the closed wrapper, which air could cause deterioration of the product or undesirable inflation of the final confection; this latter factor could cause the wrapper to tear.

After the sheets 1 and 2 have been sealed in the manner described, the product P finds itself wrapped in a sheet wrapper having the characteristics illustrated more clearly in Figure 6. In practice, the lower and upper parts of the product respectively are tightly covered by the sheets 1 and 2, the peripheral portions of which are sealed together so as to form a so-called "ring of Saturn", that is, a collar 10 projecting around the product P.

Contrary to the effect shown, for example, in the solution of EP-A-0 591 742, the said collar or ring of Saturn 10 is not planar but, on the contrary, is frusto-conical, with a conic angle $\alpha$ defined by the conic angle $\alpha$ of the mouth portions 102 and 106 of the tools 100 and 104.

This particular shaping of the collar 10 means that, when it is further formed, so as to be folded against the product P to give the final configuration illustrated in Figure 7, the zone along which the sheets 1 and 2 are joined is not subjected to appreciable stress. Experiments carried out by the Applicant have shown that this factor is important to ensure the sealing of the wrapper and to minimise the risk of tearing during subsequent operations.

The particular shaping of the collar 10 is thus such that it is already pre-shaped in the direction of its final desired deformation: the collar 10 has, so to speak, already been given a so-called "inducement" towards its final position.

As, moreover, has already been stated, in the embodiment illustrated here, the sheet 1 in the final wrapper is folded at the collar 10 so as to lie against the product P and the collar part of the sheet 2. In other words, with reference to Figure 6, the collar 10 is folded upwardly.

This choice is not however imperative. It would in fact be possible to consider the exactly complementary solution, for example a solution in which the collar 10 is folded downwardly so that:

- the upper part of the product P is covered by the sheet 2,
- the lower peripheral portion of the product is covered both by the sheet 1 and the sheet 2 folded closely over the sheet 1 and
- the base portion of the product, facing downwardly is covered solely by the sheet 1.

In this case, naturally, the collar 10 would be given an "inducement" in the opposite direction from that illustrated in Figure 6, such that, instead of being bent upwardly, the collar 10 would be bent downwardly (still in a frusto-conical form).

This result may be achieved in at least two different ways, that is:

- by forming (as already suggested above) the surfaces of the mouth portions 102 and 106 of the tool 100 and 104 in a manner complementary to that illustrated, the mouth portion 106 of the tool 104 thus having a flared mouth which opens downwardly and in which a tapered mouth part 102 of the tool 100 is inserted; or simply
- by leaving the geometry of the tools 100 and 104 the same as that illustrated in Figures 2 to 5 but reversing the manner of introduction of the product P, by inserting the product P in the tool 100 in a condition in which it is overturned through 180° with respect to that illustrated in Figure 3, that is with its upper cap portion facing downwardly and not upwardly.

The subsequent treatment of the collar 10 (whatever its orientation) can also be achieved in various different ways. The collar 10 may simply be formed against the product P or, before being formed against the product P, the collar may be cut as shown schematically in Figure 7. The solution illustrated in Figure 7 is particularly pleasing from an aesthetic point of view when the sheets 1 and 2 have different colours from each other, the sheet 1 for example being green and the sheet 2, gold or silver. In this case the sheet 1 has the effect of simulating a type of leaf in which the product P is enveloped. In each case it will be appreciated that a solution such as that illustrated in Figure 7 allows the pleated paper cup often used for the packaging of products such as that illustrated to be dispensed with.

With regard to the folding of the collar portion 10 against the product, it is possible to use various generally known techniques, such as the use of a tool similar to that described in European Patent EP-B-0 082 952 or the product P may simply be allowed to fall through the cavity in the tool 100 from the position illustrated in Figure 5 after the tool 104 has been raised in order to loosen the clamping action exerted on the collar 10 by the tools 100, 104 during sealing.

## Claims

1. A method for wrapping a product (P) in a wrapper of sheet material, including the following steps:

   - providing a first sheet (1) and a second sheet (2) of wrapping material,
   - forming the first sheet (1) into a generally hollow shape so as to make it able to receive the product (P),
   - inserting the product (P) in the hollow of the first sheet (1) in conditions whereby the first sheet (1) covers a respective part of the product (P),
   - applying the second sheet (2) over that part of the product (P) left uncovered by the first sheet (1), forming the second sheet (2) into a shape complementary to that of the respective part of the product (P),
   - joining the first sheet (1) and the second sheet (2) so as to form a collar (10) extending around the product (P) and so forming a wrapper which is substantially closed around the product (P) itself, and
   - forming the collar part (10) further so as to fold it closely against the product (P),

   characterised in that the first sheet (1) and the second sheet (2) are joined together to form the collar (10) along a frusto-conical surface whereby the collar part (10) is already bent in the direction of the said further forming.

2. A method according to Claim 1, characterised in that the frusto-conical surface has a conic angle ($\alpha$)of the order of 45°.

3. A method according to Claim 1 or Claim 2, characterised in that the first sheet (1) and the second sheet (2) are brought together along a principal direction (D) and in that the axis of the frusto-conical surface is aligned with the said direction (D).

4. A method according to any one of Claims 1 to 3, characterised in that the collar part (10) is cut before it is folded against the product (P).

5. A method according to any one of Claims 1 to 4, characterised in that the first sheet (1) and the second sheet (2) are joined together to form the collar (10) by a joining step selected from the group constituted by:

   - mechanical forming,
   - sealing with the addition of material,
   - heat sealing,
   - ultrasonic welding.

6. A method according to any one of Claims 1 to 5, characterised in that the faces of the first sheet (1) and the second sheet (2) intended to be joined together are coated with a layer of hot-melt material.

7. A method according to any of Claims 1 to 6, characterized in that the first sheet (1) and the second sheet (2) are selected from metallic materials, preferably aluminium.

8. A method according to any one of Claims 1 to 7, characterised in that the first sheet (1) and the second sheet (2) are selected with different colours.

9. A method according to any one of Claims 1 to 8, characterised in that the first sheet (1) is joined to the second sheet (2) under vacuum (D) so as to avoid air being trapped between the product (P) and the wrapper formed.

10. Equipment for carrying out the method according to Claim 1, characterised in that it includes:

    - forming means (100,104) for forming the first sheet (1) and the second sheet (2) into shapes substantially complementary to those of respective portions of the product (P), and
    - joining means having complementary surfaces (102, 106) for joining the first sheet (1) and the second sheet (2) so as to form the collar part (10) extending around the product (P) along the said substantially frusto-conical surface.

11. Equipment according to Claim 10, characterised in that the complementary surfaces (102, 106) are frusto-conical surfaces having a conic angle of the order of 45°.

12. Equipment according to Claim 10 or Claim 11, characterised in that the said parts are complementary surfaces (102, 106) shaped to clamp the first sheet (1) and the second sheet (2) together.

13. Equipment according to Claim 12, characterised in that, of the said complementary surfaces, one (102) is defined by a part made from yielding material and the other (106) has surface sculpturing (107) whereby, when, the complementary surfaces (102) clamp together the first sheet (1) and the second sheet (2), the surface sculpturing (107) deforms and shapes the first sheet (1) and the second sheet (2) as a result of the yielding of the yielding surface (102).

14. Equipment according to Claim 13, characterised in that the part made from yielding material (102) comprises an insert of yielding material such as polytetrafluoroethylene (TEFLON).

15. Equipment according to any one of Claims 10 to 14, characterised in that the forming means (100, 104) have a generally hollow structure and associated vacuum-generator means (D) which can evacuate air from the hollow structure.

16. Equipment according to any one of Claims 10 to 15, characterised in that the forming means comprise two complementary forming elements (100, 104).

17. Equipment according to any one of Claims 10 to 16, characterised in that the joining means carry associated heating means (108) which can heat at least one of the complementary surfaces (102, 106) so as to promote the local fusion of the first sheet (1) and the second sheet (2) to join them together.

18. Equipment according to any one of Claims 10 to 17, characterised in that the forming means (100, 104) are of generally tubular structure.

FIG. 1

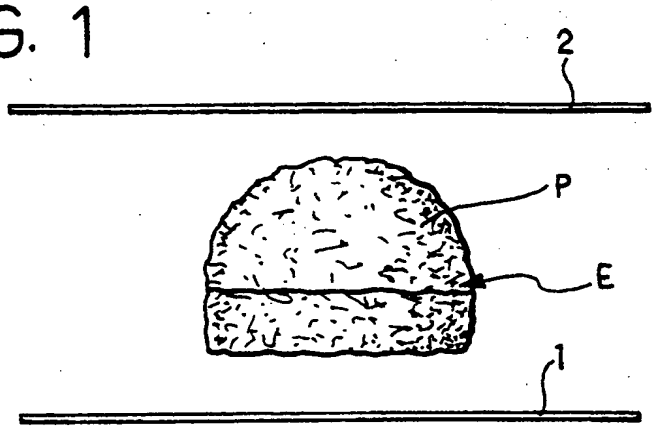



FIG. 2

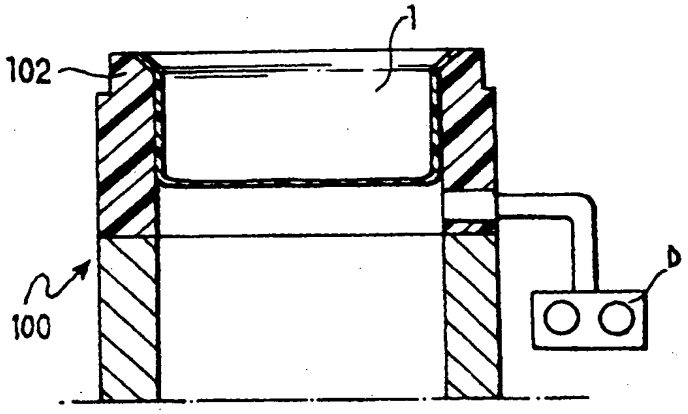



FIG. 3

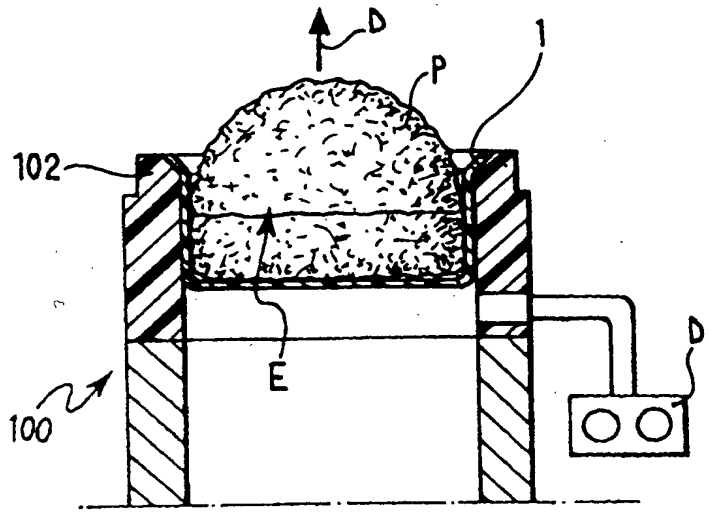


FIG. 4

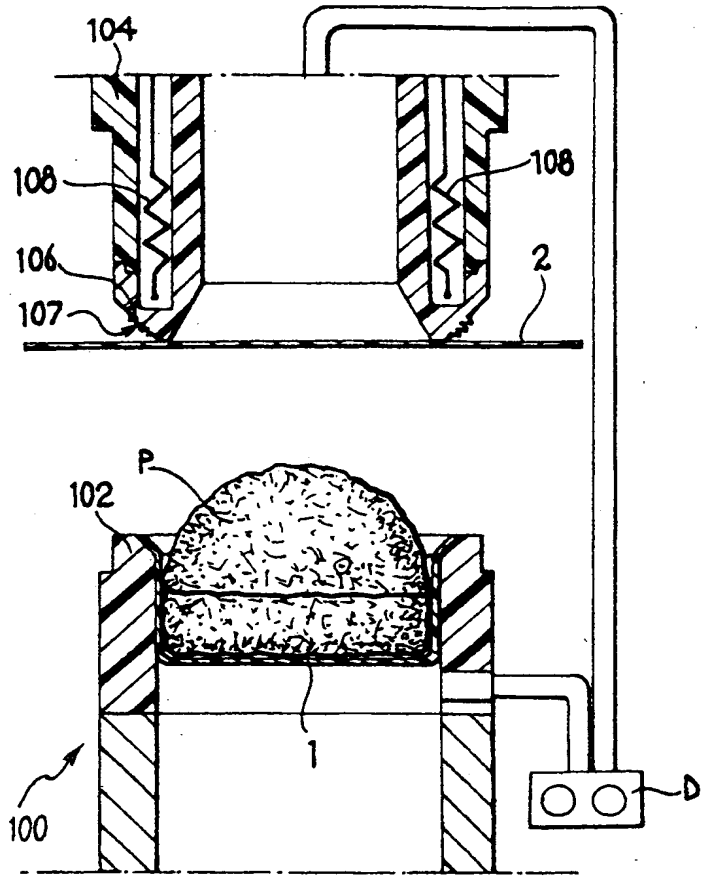



FIG. 7

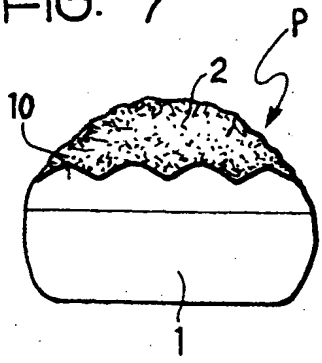



FIG. 5

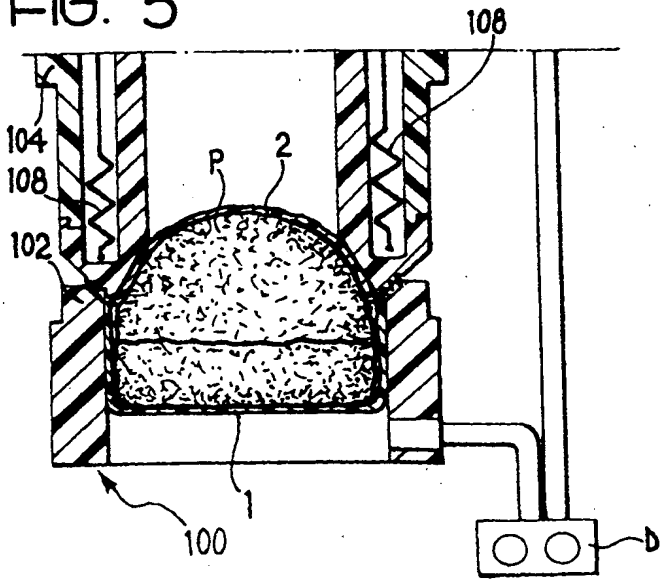
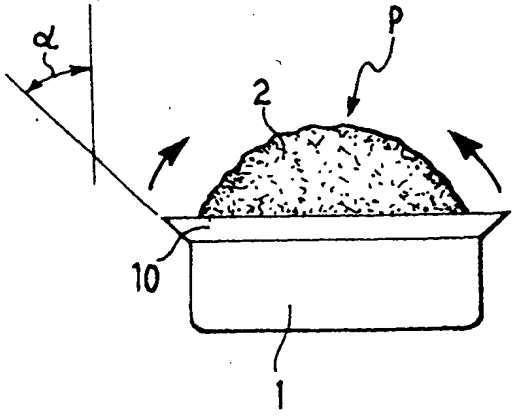



FIG. 6



European Patent Office

# EUROPEAN SEARCH REPORT

Application Number
EP 97 10 1754

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
|---|---|---|---|
| A,D | EP 0 591 742 A (SOREMARTEC)<br>* the whole document * | 1,10 | B65B11/50 |
| A | FR 1 343 517 A (FERRERO)<br>* the whole document * | 1,10 | |

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65B

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 20 May 1997 | Claeys, H |

CATEGORY OF CITED DOCUMENTS

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P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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